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IS 4495 (1992): Cinematography - light output of narrow gauge film projectors - Method of measurement [MED 32: Photographic Equipment]



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भारतीय मानक
सिनेमैटोग्राफी — लघु गेज फिल्म प्रोजेक्टरों के लिए
लाइट निवेश — मापन पद्धति
(पहला पुनरीक्षण)

Indian Standard

CINEMATOGRAPHY — LIGHT OUTPUT OF
NARROW GAUGE FILM PROJECTORS —
METHOD OF MEASUREMENT
(*First Revision*)

UDC 778.2 : 778.55 : 535.241

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Cinematographic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

This standard was first published in 1968. It has been revised to bring it in line with modern development of cinematograph projectors and measuring techniques.

The purpose of this standard is to describe a method of measuring the total light output of a projector over the image area projected and the distribution of light within this area. It does not specify desirable values for either luminance or distribution. These matters for 16 mm film projectors are dealt with in IS 4496 : 1968 'Screen luminance for the projection of 16 mm film by incandescent lamps'.

The procedure given in this standard is not intended to be a laboratory precision measurement; such a test would involve, amongst other things, the use of a calibrated lamp and a photometer of known accuracy. The method covered by this standard is a practical working test. The results obtained shall necessarily be influenced by the variations which are inevitable in the light output and filament characteristics of commercial lamps, by any departure from optimum adjustment of the optics of the projector and of the lamp position, by cleanliness, and by the recognized limits of error in commercial photometers; but the test nevertheless provides simple and convenient means of assessing, to a reasonable order of accuracy, the performance of a projector under field conditions.

The measurements to be taken are so devised as to furnish not only the total light output of the projector but also to give a quantitative measurement of the ratio of the illumination of the side of the screen relative to the centre, as is required for the application of IS 4496 : 1968 and also a general indication of the evenness of the illumination over the whole area of the screen.

While preparing this standard, assistance was derived from IEC Publication 574-20 Audio-visual, video and television equipment and systems: Part 20 Methods of measuring and reporting the performance of 16 mm sound film projectors; issued by the International Electrotechnical Commission in 1988.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CINEMATOGRAPHY — LIGHT OUTPUT OF NARROW GAUGE FILM PROJECTORS — METHOD OF MEASUREMENT

(First Revision)

1 SCOPE

1.1 This standard specifies the method of measurement of the light output of cinematograph projectors for narrow gauge film (16 mm and less).

2 REFERENCES

2.1 The following Indian standards are necessary adjuncts to this standard:

IS 1248 (Part 2) : 1983	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 2 Ammeters and voltmeters (<i>second revision</i>)
IS 4496 : 1968	Screen luminance for the projection of 16 mm film by incandescent lamps
IS 4497 : 1977	16 mm portable sound- and picture cinematograph projectors (<i>first revision</i>)
IS 5700 : 1977	Cinematograph screens (<i>first revision</i>)

3 APPARATUS REQUIRED FOR THE MEASUREMENT

3.1 The following apparatus are required:

- a) A luxmeter having a spectral sensitivity similar to that of a Standard Observer, as agreed by the International Commission on Illumination in 1924 and adopted in 1933 by the International Committee of Weights and Measures;
- b) Voltage regulator and voltmeter conforming to IS 1248 (Part 2) : 1983; and
- c) Screen conforming to IS 5700 : 1977 and IS 4496 : 1968.

4 MEASUREMENT CONDITIONS

4.1 Environmental Conditions

Measurements are to be carried out at any combination of temperature, humidity and air

pressure within the following limits:

- a) Ambient temperature : 15°C to 35°C, preferably at 20°C
- b) Relative humidity : 45% to 75%
- c) Air pressure : 86 kPa to 106 kPa

4.2 Preconditioning

Before the commencement of any test(s), the projector shall be preconditioned by being kept under the environmental conditions specified for at least 24 hours.

When the film transport speed accuracy is to be measured, there shall be additionally a warming up time as specified in particular standard for the projector (*see* IS 4497 : 1977).

4.3 Adjustments and Settings

The projector shall be equipped with a suitable and readily available lens recommended by the projector manufacturer (normally of focal length approximately 50 mm).

Before the tests, the projector shall be set up on a firm stand at a suitable distance from a vertical matt white screen to produce an image of a size appropriate to the type of use for which the projector is designed, with the axis of the projection beam normal to the centre of the screen surface.

The lamp alignment adjustment, where provided, shall be set in accordance with the recommendations of the projector manufacturer. The focus and framing shall be set, using a general purpose image test film, to give the best resolution at the centre of the picture. The test film shall then be removed.

When adjusting the mains supply, the voltage shall be measured at the supply socket to which the recommended power supply cord is connected.

For tests of light output and distribution of screen illumination, the voltage of the mains supply used shall be adjusted to within 0.5 percent of the value to which the voltage selector of the projector is set or, if no selector is fitted, to within 0.5 percent of the rated voltage for the projector.

A projector designed to cover a range of voltages without adjustment, by fitting a lamp designed for the local mains voltage, shall be tested with a supply voltage adjusted to within 0.5 percent of the voltage marked on the lamp used for the test. If the lamp itself is marked for a range of voltages, the supply voltage shall be adjusted to within 0.5 percent of the mean voltage of this range.

A projector, in which the lamp may be run at a reduced light output in the interests of increased lamp life, shall be tested in the condition giving normal (non-reduced) light output.

NOTES

1 Different samples of the same type of filament lamp may vary in performance. Tests should be made with at least five lamps selected at random and the average test results calculated. Lamps used for the measurement of light output should be aged prior to their use in accordance with the recommendations of the lamp manufacturer.

2 When testing a range of projectors for the purposes of comparative testing, the following conditions shall be complied with :

- i) For projectors which use the same type of lamp, the same lamp shall be used for all tests of light output and distribution of screen illumination; and
- ii) Lenses of, as near as possible, the same characteristics (focal length and relative aperture) shall be used in each projector.

For all tests of sound performance, the projector shall operate at the sound-film projection speed of 24 ± 1 frames per second (see note) as specified in IS 4497 : 1977. A resistive load impedance equal to the rated load impedance of the power amplifier shall be connected to the loudspeaker output of the amplifier and any ton control(s) fitted shall be set at the position(s) giving a flat frequency response.

NOTE — If the film transport speed may not be set accurately, this shall be reported clearly in the test results.

5 MEASUREMENT OF LIGHT OUTPUT

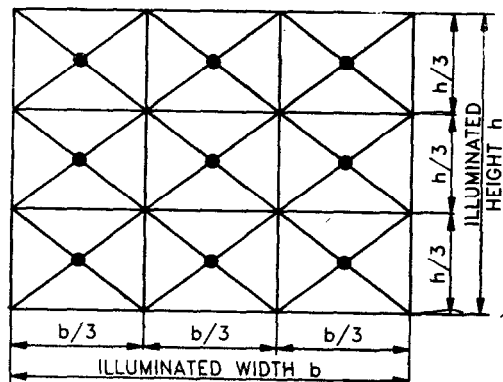
Measurements for calculating light output shall be made with a suitable luxmeter having its spectral response corrected to the sensitivity of a Standard Observer as agreed by the International Commission of Illumination in 1924 and adopted in 1933 by the International Committee of Weights and Measures.

Before measurements are started, the projector shall be operated with the lamp on for at least 15 minutes. The projector shall be tested in normal operating conditions with the shutter running; projectors having adjustable shutter interruption (for example 2/3 blade) shall be measured at each setting of the adjustment and the test results shall be appropriately identified. There shall be no film in the projector gate during the test, but the focus is set correctly as if the film were present.

Any stray light reaching the screen, in addition to that projected through and directly from the projector's objective lens, shall be kept to a minimum. This stray light shall not exceed 1 percent of any individual reading.

NOTE — Where there is a switched electrical adjustment of the light level, it may be useful for measurements to be made for each setting.

The light reaching the nine points on the screen as defined in Fig. 1 shall be measured (see also 6).



NOTE—THE DOTS INDICATE THE MEASUREMENTS POINTS

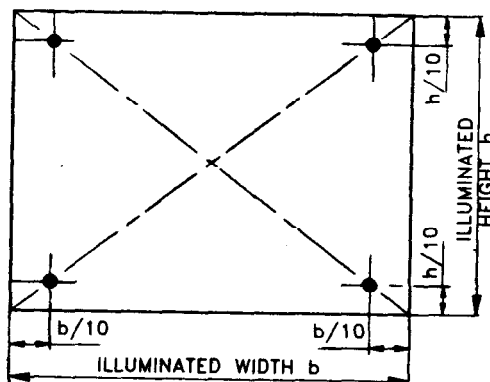
FIG. 1 LIGHT OUTPUT

The measurements shall be recorded in lux (lumens per sq metre) and the total light output (lumens) calculated by multiplying the average of these readings (lux) by the illuminated area of the screen (square metres)

6 DISTRIBUTION OF SCREEN ILLUMINATION

Illumination measurements shall be made at the centre of the screen and at each of the four corner points as shown in Fig. 2. These measurements shall be made under the same conditions and at the same time as for light output according to 5.

NOTE — The dots indicate the measurement points.



NOTE—THE DOTS INDICATE THE MEASUREMENTS POINTS

FIG. 2 DISTRIBUTION OF SCREEN ILLUMINATION

7 REPORT OF RESULTS OF MEASUREMENT

Following information should be given in the report of each measurement :

- a) Particulars of the projector, in accordance with IS 4497 : 1977 including its serial number, and the number of dark phases during the picture cycle;
- b) Particulars of the projection lens, including focal length and relative aperture;
- c) The dimensions and aspect ratio of the aperture plate;
- d) If the condenser lens is removable and the maker offers different types, particulars of the lens employed during the measurement;
- e) The make, voltage, wattage, lumen output and life ratings of the lamp;
- f) The voltage across the lamp when the projector is operating and the lamp is alight; and

- g) The ratios between a reading at the centre and the reading at each side on the horizontal axis :

- i) the two distribution factors, that is, $\frac{\text{sum of 9 readings}}{9 \times \text{centre reading}}$, and
- ii) the total lumens output, that is, the average of the 9 readings \times illuminated area in square metre.

8 INTERPRETATION OF THE REPORT

The performance of a projector in respect of its light output should not be judged by any one of the above factors alone since each has its significance concerning the overall quality of projection. For example, high lumens is not necessarily indicative that the projector can produce satisfactory screen illumination; distribution also is important. For optimum requirements for distribution, reference should be made to IS 4496 : 1968.

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